Reproducible Research Repository

Concentration of Critical Mining Assets and the Geoeconomic Fragmentation

Third Submission: RR_WLD_2025_268
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This review verifies the reproducibility of the exhibits included in the paper *"Concentration of Critical Mining Assets and the Geoeconomic Fragmentation"*.

Contents in this review:

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Main findings

- **Every exhibit has been reproduced accurately.**

- The code was successfully executed without changes.

- The output demonstrates consistent stability across multiple runs. Specifically, executing the code two times consecutively yielded identical results.

- The code takes approximately 1 hour to run.

- We conducted our reproducibility analysis based on the paper shared by the authors via OneDrive on February 14, 2025.

- **Reproducibility Summary**:

  - **Data**: Some data is restricted and has not been included in the reproducibility package. For more details, please refer to the README file.
  - **Code**: All code files (from cleaning to analysis) are included in the reproducibility package.
  - **Outputs**: All outputs are generated by code included in the reproducibility package.
  - **Reproducibility verification**: Reviewers used data provided directly by the authors to conduct the reproducibility verification, and this is not included in the public reproducibility package. The reviewers verified that publicly available data matches the data provided by the authors.
  - **Dependencies environment**: The reviewers created a new environment for dependencies using the latest versions available for each dependency at the moment of the review.

List of exhibits and reproducibility status

Results in the Main Section of the Paper

- **Figure 1** Reproduced.

- **Figure 2** Reproduced.

- **Table 1** Reproduced.

- **Figure 3** Does not apply: the exhibit does not show analysis results.

- **Figure 4** Reproduced.

- **Figure 5** Reproduced.

- **Figure 6** Reproduced.

- **Table 2** Results reproduced, but the exhibit includes manual changes from the code output. First, the order of rows was changed manually by adding an extra column for category by different mineral types, which the code output does not have. Second, the last row ("*Average*") was manually added in the exhibit. The reviewers verified that these rows for the columns "*HHI (geographic)*", "*HHI (Direct)*", and "*HHI (EO)*" result from the average of all the other rows. Third, columns "*DIFF Direct/GEO*" and "*Diff EO/GEO*" are the result of estimating the percentage variation between "*HHI (Direct)*" and "*HHI (geographic)*", and between "*HHI (EO)*" and "*HHI (Geographic)*", respectively. The exhibit was compared against *table_df_production_combine.xlsx*.

- **Figure 7** Reproduced.

- **Figure 8** Reproduced.

- **Figure 9** Reproduced.

- **Figure 10** Reproduced.

- **Figure 11** Reproduced.

- **Figure 12** Reproduced.

  Results in the Appendix

- **Figure 13** Reproduced.

- **Figure 14** Reproduced.

- **Figure 15** Reproduced.

- **Table 3** Results reproduced, but the exhibit includes manual changes from the code output. First, the order of rows was changed manually by adding an extra column for each category breakdown by different mineral types, which the code output does not have. Second, the last row ("*Average*") was manually added in the exhibit. The reviewers verified that these row for the columns "*HHI (geographic)*", "*HHI (Direct)*", and "*HHI (EO)*" result from the average of all the other rows. Third, columns "*DIFF*

Direct/GEO" and "*Diff EO/GEO*" result from estimating the percentage variation between "*HHI (Direct)*"
and "*HHI (geographic)*", and between "*HHI (EO)*" and "*HHI (Geographic)*", respectively. The exhibit was
compared against *table_df_reserves_combine.xlsx*.

- **Figure 16** Reproduced.

- **Figure 17** Reproduced.

- **Figure 18** Reproduced.

Reproduction Environment

Paper exhibits were reproduced in a computer with the following specifications:

- OS: Windows 10 Enterprise, version 22H2

- Processor: Intel(R) Xeon(R) Gold 6226R CPU @ 2.90GHz 2.90 GHz (2 processors)

- Memory available: 128 GB

- Software version: Python 3.12.5